Flood Impact Assessment Report
Arapaho and Roosevelt National Forests and Pawnee National Grassland
October 2013 -DRAFT

Above: Flooding in Camp Dick Campground on the Boulder Ranger District

United States Department of Agriculture
Forest Service

Requested by:

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Arapaho and Roosevelt National Forests and Pawnee National Grassland

EXECUTIVE SUMMARY

Heavy and sustained rain over multiple days caused flooding and damage on the Boulder (BRD), Canyon Lakes (CLRD) and Clear Creek (CCRD) Ranger Districts and the Pawnee National Grassland (PNG) beginning September 11, 2013. The hardest hit areas were BRD and CLRD. The flooding damaged National Forest System (NFS) facilities and infrastructure as well as other resources. Additionally, much of the access to both districts is on roads which connect from Federal or State highways or county roads that have substantial damage or were destroyed.

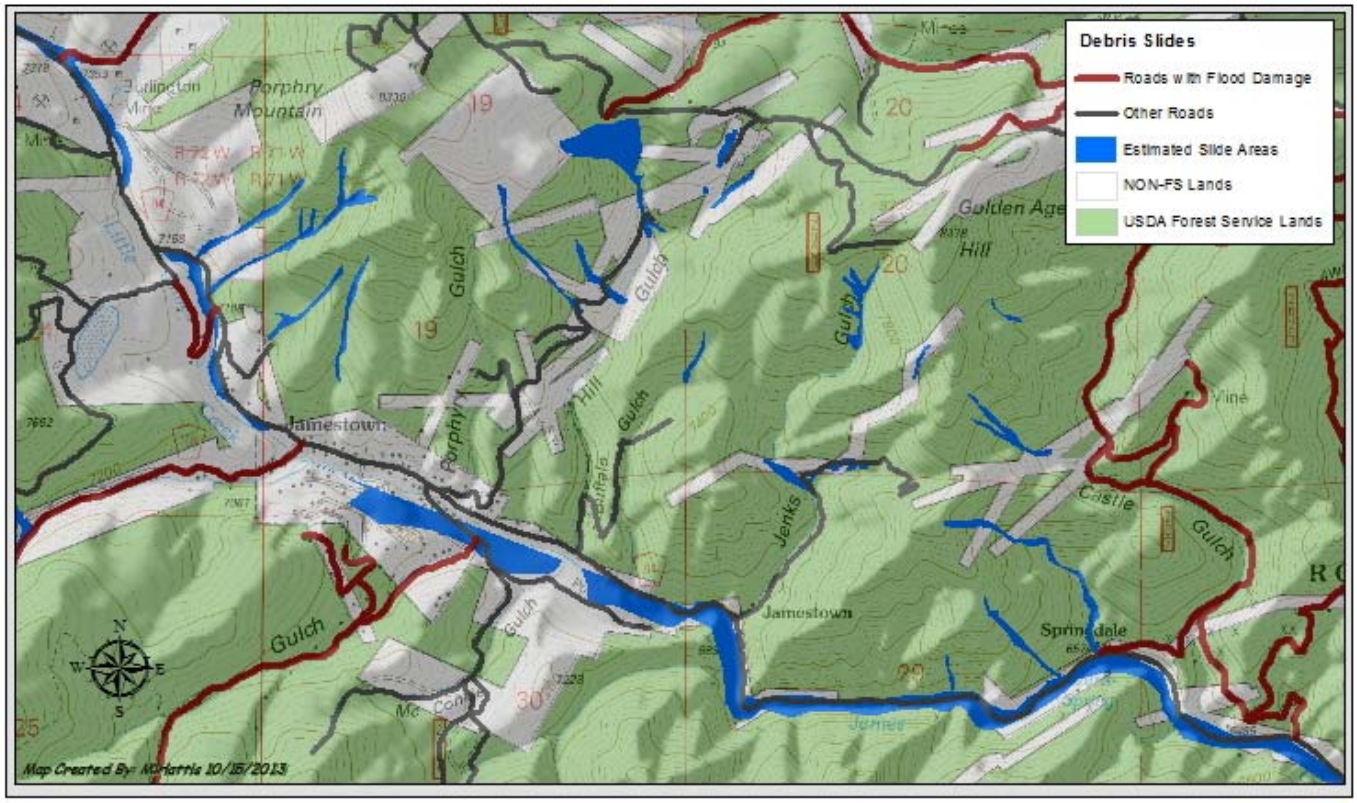
Above: Road damage at the intersection of County Road 43 and Forest Road 128 on the Canyon Lakes Ranger District.

The Arapaho and Roosevelt National Forests and Pawnee National Grassland (ARP) is an urban National Forest and one of the most visited in the United States. The landownership pattern is highly intermixed. Numerous individual homes, subdivisions or communities are located within the forest boundary on both the CLRD and BRD. Many private landowners rely on NFS roads as part of the access to their property and homes. The temporary loss of access from some State and Federal highways and many county roads has put pressure on the ARP to provide alternative access to isolated communities. Additionally, landline locations and known encroachments will need to be resolved before rebuilding can take place. Many areas will require stabilization before winter to prevent greater costs and safer conditions.

The most affected area is approximately 230,000 acres in size and has been closed since September 16 for public safety. Some of this area is expected to remain closed over the winter and beyond while work is being completed. Additionally, there are more than 144,000 acres of private land interwoven with NFS lands within this area.

On September 16, 2013 the Forest Supervisor established a Flood Impact Assessment Team (FIAT) to rapidly assess damage and imminent risk to facilities and infrastructure caused by the flooding. The FIAT followed the incident command system to accomplish their work in a safe and efficient manner. Seven to nine two-person teams surveyed damage on the ground or by helicopter from September 20 to 27. Approximately 463,000 acres of the assessment area had to be surveyed by helicopter due to inaccessibility from damaged or destroyed State and Federal highways and county roads. The FIAT completed their field work on September 26 assessing 609,000 acres, 380 roads totaling 557 miles, 17

bridges, 168 facilities including recreation sites, administrative sites, recreation residences and several hiking trails to determine, at a coarse scale, facilities or infrastructure damaged, the amount of damage, the preliminary estimated cost[1], and the general priority for repair or rehabilitation. Further assessment of damage to lower priority maintenance level (ML) 1 and 2 roads, motorized trails and hiking trails will be necessary to determine the overall cost of repair once access to these areas is available.



Above: A map of the multiple debris slides in the Jamestown area. The map also displays the complex intermixed landownership pattern common to the Boulder Ranger District.

The FIAT provided preliminary data for a more in-depth damage survey by the Federal Highway Administration's Central Federal Lands (CFL) division who developed Damage Survey Reports (DSR) to assess damage and repair needs for ML 3, 4, 5 roads and bridges; and high priority ML 2 roads that are passible with passenger vehicles.

The repair and rehabilitation was prioritized by facilities and infrastructure that:

- needs to be repaired or stabilized immediately for health or safety,
- should be repaired, rebuilt or stabilized to avoid additional costly damage that may occur,
- repair or rehabilitation can wait.

[1] Preliminary estimated costs are subject to change depending on potential revisions to design, construction costs, and market demand for construction services. Figures may increase or double.

Assessment findings are summarized in Tables 1 through 4.

Table 1. *Facility Repair Priorities and Estimated Cost of Repair*

Facility Type	**High Priority**	**Medium Priority**	**Low Priority**	**Preliminary Estimated Cost**
Campground	4	0	1	$220,000
Picnic Areas / Day Use	8	0	3	$1,432,000
Trailhead	2	16	0	$598,031
Administrative Facilities	0	0	0	$0
Parking Area	0	0	1	$350,000
Boating Access	3	0	0	$7,500
Recreation Residence Access	2	0	0	$15,000
Fishing Site	1	1	0	$400,000
Total	**20**	**25**	**5**	**$3,025,031**

Table 2. *Bridge Repair Priorities and Estimated Cost of Repair*

Number of Bridges	**High Priority**	**Medium Priority**	**Low Priority**	**Preliminary Estimated Cost**
4	2	0	2	**$2,784,954**

Table 3. *Road Repair Priorities and Estimated Cost of Repair*

Maintenance Level	**High Priority**		**Medium Priority**		**Low Priority**		**Preliminary Estimated Cost**
	# Roads	Miles	# Roads	Miles	#Roads	Miles	
1-2	29	62.2	26	66.0	35	46.2	$3,305,288
2 ERFO	3	11.7	6	13.1	1	3.4	$1,439,082
3-5 ERFO	27	33.3	13	17.1	34	73.5	$4,744,655
1-2 Not Surveyed	0	0	0	0	58	56.0	$1,120,000
Total	**59**	**107.2**	**45**	**96.2**	**128**	**179.0**	**$10,609,025**

Table 4. *Trail Repair Priorities and Estimated Cost of Repair*

Trails	**High Priority**		**Medium Priority**		**Low Priority**		**Preliminary Estimated Cost**
	# Trails	Miles	# Trails	Miles	#Trails	Miles	
Trails Surveyed	0	0	10	39.7	0	0	$79,140
Trails not Surveyed	0	0	60	196.6	0	0	$346,553
Total	**0**	**0**	**70**	**236.3**	**0**	**0**	**$425,693**

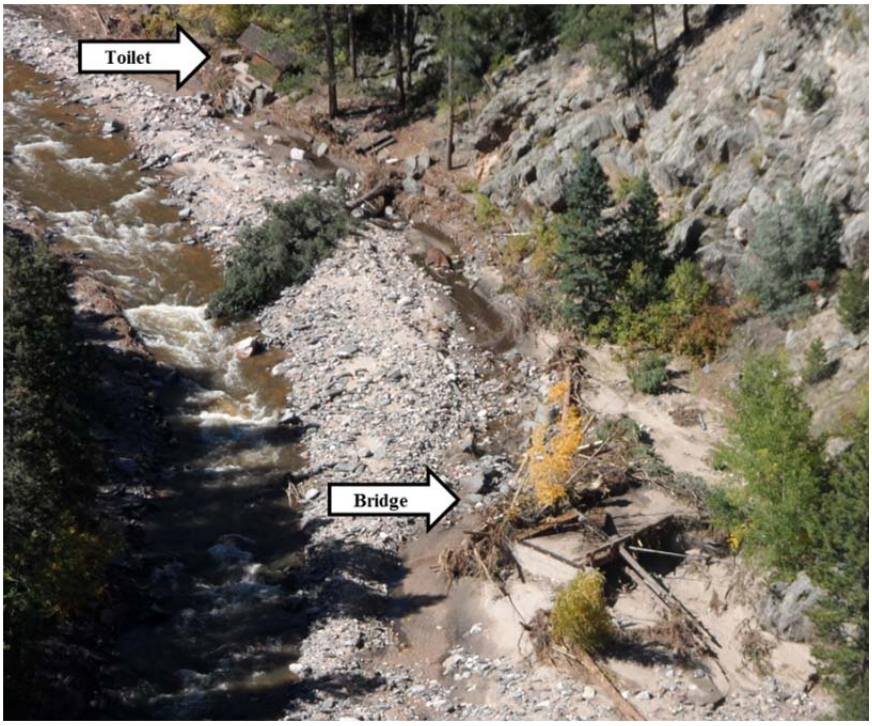
Preliminary estimated total costs for infrastructure and facilities are as follows:

- Roads - $10,609,025
- Bridges - $2,784,954
- Trails - $425,693
- Facilities - $3,025,031
- **Estimated Total Costs All – $16,844,703**

These costs are subject to change depending on design, construction and market demand for costs. CFL expects the cost increase to potentially double. Detailed tables of the assessment priorities and costs are in Appendices A and B.

The assessment of facilities and infrastructure is the first step to recovery and one aspect of the ARP response to the flood impacts. The flood changed the landscape on and around the NFS lands. Some facilities and infrastructure were relocated by flood waters on private, County, State and NFS land. Debris slides have occurred and, in many locations, the courses of rivers and creeks have changed. The ARP will be responding to these impacts**,** the associated resource damage and social issues for many years. Additional impacts are expected to fisheries, wildlife, watershed, recreation activities, range, vegetation management and heritage resources that will be addressed as repair, rehabilitation and recovery work is accomplished.

Recovery from the flood event will take several years, additional funding and resources to address. Not all high priority infrastructure and facilities can be repaired in one year. In addition some damaged infrastructure and facilities will be evaluated further to determine whether it is appropriate to be repaired, reestablished or decommissioned.



Above: In the upper left corner of the photo, a toilet from the Upper North Fork Picnic Area near Glen Haven on the Canyon Lakes Ranger District was relocated by flood waters.

The North Fork of the Big Thompson River has changed its course in this area.

The lower white arrow shows the destroyed U.S. Forest Service bridge now located on the new shoreline.

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I. OVERVIEW OF FLOODING EVENT

Above: Damage to U.S. Highway 34 near Forest Service Road 128 (Canyon Lakes Ranger District) in Drake, Colo.

Context of the Flooded Area

The Arapaho and Roosevelt National Forests and Pawnee National Grassland (ARP) is located in north-central Colorado and headquartered in Fort Collins. The Forests and Grassland encompasses 1.6 million acres of public land in the Rocky Mountains and northeastern Colorado plains. Boundaries extend north to the Wyoming border and south to Mt. Evans. The Arapaho National Forest includes lands on both sides of the Continental Divide while the Roosevelt National Forest is confined to the eastern side of the Divide. The Pawnee National Grassland is located 30 miles east of Fort Collins. The ARP manages National Forest System (NFS) lands in Boulder, Clear Creek, Gilpin, Grand, Larimer, Weld, Park and Jefferson counties.

The ARP is an urban National Forest and one of the most visited in the United States. The landownership pattern is highly intermixed with approximately 327,000 acres of private and other land ownerships within the forest and grassland boundary. The ARP is home to 53 campgrounds, and more than 1,360 miles of trails; 6,172 miles of road; 79 outfitter and guides; and 620 special use permits, including 31 major utilities, 20 reservoirs and 16 communication sites.

The Flood Event- September 11 through 17

Heavy and sustained rains began on September 9 and increased on September 11 when major flooding began in Boulder and Larimer counties including NFS lands on the BRD and CLRD. The flooding area was declared a disaster on September 12 by President Obama.

Much of the access to both ranger districts is through State or Federal highways or county roads that have substantial damage or were destroyed by the flood. Both the CLRD and BRD have many individual homes and subdivisions or communities located within the Forest boundary. Many private landowners rely on Forest Service roads as part of the access route to their property and homes. The temporary loss of major portions of the highway system and many county roads in addition to Forests Service roads has isolated many communities whose homes are intact. The area most affected on the ARP is approximately 230,000 acres with an additional 144,000 acres of private land interwoven with NFS lands.

II. INITIAL RESPONSE

Initial response by the ARP focused on employee and visitor safety and assisting Boulder and Larimer counties with incident management response.

Employee and Visitor Safety

On September 12, 2013, while the flooding continued the ARP leadership focused on employee and visitor safety. The BRD office was closed due to concerns for employee safety due to flooding and dangerous driving conditions. Employees were accounted for on all districts and conditions and flooding effects were discussed with leadership. All field activities on the BRD, CLRD, CCRD and PNG were cancelled. The permit administrator contacted American Lands and Leisure (AL&L), the permit holder for the campground concession as well as each campground host to assess conditions and visitor safety needs. The ARP Law Enforcement Officers assisted with hunter and other recreation related evacuations.

The BRD office remained closed on September 13 through 15 while flooding continued. Additionally, the CCRD was also closed on September 13 due to rockslides and dangerous travel conditions. The PNG and Fort Collins area offices remained opened and employees were offered liberal leave or telework options for addressing difficult commutes. Employees were once again accounted for and in contact with leadership. Alternative housing locations were established for CLRD bunkhouse occupants on evacuation alert and emergency response assets were relocated. On September 13, the fsweb was established as a tool together with direct emails from the Forest Supervisor to keep employees informed on changing conditions and flood response. Field work remained restricted. The ARP continued daily contact with the AL&L and their hosts. Both Boulder and Larimer County Sheriffs were notified about campground occupancy, access and how long visitors and hosts could shelter in place. A press release was issued to discourage recreation travel and other activities on the four ranger districts due to uncertainty about road conditions. This action was followed by a closure order for public safety. The initial order covered approximately 260,000 acres of NFS lands.

Above: Boulder County Road 82

Over the course of the next several days employees were regularly updated and accounted for. Some employees experienced damage or loss of their home, business or vehicle. Four were evacuated and ten now had significant commutes to work. Leadership provided resources and Employee Assistance Program information to these employees and continues to

offer support. Field going activities on all four (BRD, CCRD, CLRD and PNG) units remained restricted for several weeks.

Daily contact continued with campground hosts and a webpage was established at www.fs.usda.gov/goto/arp/flood2013 to provide visitors with a place to find all flood related information, press releases, closure and safety information.

Above: The Middle Fork of the Saint Vrain Creek near the Boulder Ranger District.

Incident Management Assistance

Fort Collins Interagency Dispatch Center assisted Boulder and Larimer counties with the assembling of resources from the start of the flood incident and later established expanded dispatch to continue support. The Roosevelt Hotshots, the helicopter stationed at the Fort Collins Administrative site, associated helicopter module and other incident personnel from the ARP were dispatched to assist in the incident.

The Boulder and Canyon Lakes District Rangers were assigned as Agency Representatives to their respective county. As agency representatives, they ensured the ARP closure orders supported rescue and recovery actions, resolved access issues for residents who needed to travel through the closed area to remove essential items, winterize their homes or have periodic subsistence travel.

All other ARP resources were held in place for use for ARP responses to the flood or other incidents.

III. RAPID ASSESSMENT

Mission

On September 16, 2013 the Forest Supervisor established a FIAT. The purpose of the ARP FIAT was to complete a rapid assessment of damage and imminent risk to facilities and infrastructure caused by the September 2013 flood. The FIAT focused on the BRD and CLRD. A brief evaluation of the other ranger districts was conducted with the finding of minimal or no impacts resulting from the flood event on facilities and infrastructure. Below are sections of the FIAT Project Initiation Charter that outlined the scope of work.

Above: The entrance to Lefthand Canyon OHV Area on the Boulder Ranger District.

Scope of Assignment

The FIAT will assess damage at coarse scale using the following process as a template:

1. Determine if the facility or infrastructure is damaged.
2. Determine a relative level/amount of damage.
3. Determine the cursory estimated cost to repair, recover or rehabilitate.
4. Determine the priority for repair, recovery or rehabilitation. For example, (1) needs to be repaired immediately for health and safety reason, (2) should be repaired soon or more costly damage will occur or (3) can wait.
5. Determine if there are any short-term risks to facilities and infrastructure (e.g., from instable soils or slopes).

The following infrastructure will be assessed (in order of priority):

1. Roads and bridges - maintenance level 3-5 first and some high priority level 2s.
2. Campgrounds
3. Trailheads
4. Administrative sites
5. Culverts – major stream crossings

If time permits or in a later assessment, then:

1. Culverts – cross drains
2. Motorized trails
3. Non-motorized trails (excluding Wilderness)
4. Lower priority maintenance level 2 roads

Outcomes

The FIAT will determine the scale and scope of damage and risk to ARP facilities and infrastructure impacted by the flood. In addition, the Team will complete a preliminary prioritized repair, recovery and rehabilitation list of work and associated cost estimates.

Deliverables

A concise report that documents the findings and outcomes will be prepared. This report will be a first level assessment that informs future repair, recovery and rehabilitation planning efforts, and funding proposals.

Timeframe

The FIAT was assigned to complete a "rapid" assessment across the BRD and CLRD. The goal was to complete the assessment within two weeks and provide a final report to the Forest Leadership Team within four weeks.

Incident Command Structure

The FIAT utilized the Incident Command System (ICS) structure for the flood assessment to provide an organizational structure of common processes for planning and managing resources. This structure also enabled a coordinated response among various jurisdictions and functional agencies, both public and private. Due to the complexity of the flood event over multiple ranger districts and initially with multiple Incident Management Teams (IMTs), the ICS structure allowed for an integrated organizational structure to match the complexities and demands of multiple incidents over jurisdictional lines.

Left: The Ceran Saint Vrain Trailhead parking barrier was moved across the creek by flood waters on the Boulder Ranger District.

The FIAT IMT included the individuals listed in Table 5.

Table 5. *FIAT IMT Members*

Incident Commander (IC) and Staff	o IC: *Richard Edwards* o Deputy IC: *Kevin Zimlinghaus*	o Safety Officer: *Mat Clementi* o Information Officer: *Tammy Williams* o Liaison Officer: *Jackie Parks*
Agency Representatives	o BRD: *Sylvia Clark* o Forest: *Ron Archuleta*	o CLRD: *Kevin Atchley*
Expanded Dispatch	o Fort Collins Interagency Dispatch Center Staff	
Finance Section	o Section Chief: *Tracey Parish*	
Planning Section	o Section Chief: *Mike Foley* o Resource Unit Leader: *Paul Peck* Resource Advisors- o Lands and Special Uses: *Mike Johnson, Sue Greenley, Liz Moncrief* o Land Survey: *David Tomaschow*	o Documentation Unit Leader: *Carol Kruse* o Technical Specialists-GIS: *Mary Hattis* o Recreation: *Leslie McFadden, Kevin Cannon* o Hydrologists: *Carl Chambers , Eric Schroder* o Fisheries: *Matt Fairchild*
Operations Section	o Section Chief: *Will Briggs/Chet Dieringer* o Air Operations Branch Director: *Scott Nutt* o Helicopter Manager: *Sonya Whitesell* o Division Law Enforcement: *Paul Krisanits (BRD), Lenora Arevalos (CLRD)*	o Branch Chief: *Michele White* o Division Infrastructure: *Judy Kittson (BRD), Kip Klein (CLRD), Scott Mitchell (Bridges)* o Division Facilities: *Cat Luna (BRD) Kristy Wumkes (CLRD), Lenora Arevalos (CLRD)*

Field Assessment Personnel

The span of control of the original FIAT was expanded to include Division leads on each district for both facilities and infrastructure. Survey crews of at least two people worked for the team leads and were assigned to conduct evaluation surveys for the respective Forest assets. Due to access limitations on both ranger districts, some of the surveys were completed utilizing helicopter reconnaissance. Personnel who assisted with the survey evaluations are listed in Table 5.

Table 6: *Survey Crew and Data Entry Team Members by Ranger District*

ARP Forest Supervisor's Office		
o *Crystal Landis*		
Boulder Ranger District		
o *Linette Ambrosio*	o *Joseph Graham*	o *Greg Midzak*
o *Bev Baker*	o *Colin Hutten*	o *Raechel Owens*
o *Chad Buser*	o *Kariann King*	o *Devin Steakley*
o *Jackie Crosthwait*	o *Kelsey Lesniak*	o *Jolene Wright*
o *Tim Egan*	o *Beth Liska*	
Canyon Lakes Ranger District		
o *Chad Avery*	o *David Grote*	o *Reid Marquardt*
o *Chris Carroll*	o *Nathan Hallam*	o *Robert Overstreet*
o *Will Caudill*	o *Steve Kittrell*	o *Landon Smith*
o *Chet Dieringer*	o *Scott Nilson*	o *Steve Wood*
o *Jane Gordon*	o *Dan Lowell*	o *Justin Ybright*
o *Evan Gray*	o *Cole Maier*	o *James White*

Summary of Approach for Assessment

Methodology

The IMTs that were in place prior to the FIAT provided initial information about the overall landscape and highlighted specific trouble areas to focus the assessment. The FIAT utilized the existing database (INFRA), GIS data, damage severity data and a draft of the Sub-Part A (Travel Management Rule) reports for the BRD and CLRD to prioritize the infrastructure to be evaluated on the two districts. It was determined that both field and aerial reconnaissance surveys would be required to collect the data for this assessment.

The survey crews conducted rapid assessments of specific infrastructure and facilities. The field data collected was subjective with limited detail. For roads, information was captured on general road conditions and drainage/stream crossing conditions. For facilities, information was captured on extent of damage and type of impact as well as impacts to the water systems and toilets. For both roads and facilities, an overall rating value based severity of damage or loss was recorded on a simple data collection form along with a recommended response action if applicable. Photo logs and Global Positioning System (GPS) points were captured on the data collection forms to aid in cost estimations and mapping of damage.

Cost estimates for roads were based on Damage Survey Reports or an estimated average cost per mile based on Maintenance Level and damage severity. Cost estimates for facilities were based on the Recreation Analysis Report and field knowledge. The assessment included GPS points and photos with a written report to document damage. The data was compiled and priorities were organized across the Forest for implementation purposes in Appendices A and B.

Coordination with Incident Management Teams

The ability of the counties to respond to the incident was quickly exceeded. As a result the State of Colorado requested Federal assistance from FEMA. Through FEMA, Larimer and Boulder counties had Type 2 IMTs assigned to assist with search and rescue operation efforts prior to the FIAT organization. Rocky Mountain Team B, IC Dan Dallas was assigned to Boulder County and Rocky Mountain Team A, IC Shane Del Grosso was assigned to Larimer County. The FIAT coordinated efforts with the respective IMT throughout their assignment. Communications with dispatch, respective IMT's Operation Chiefs, and Air Operations were essential in a safe and coordinated effort throughout this process. Both ranger districts exchanged information and GIS data with their respective counties in a collaborative effort to assess the impacts of the flood event. General information and planning meetings for multi-agency partners (Boulder and Larimer counties and Rocky Mountain National Park) and the general public were represented by each district ranger, Forest Supervisor's Office personnel and FIAT Liaison Officer on a consistent basis to both gather and provide information as it became available.

Coordination with Federal Highway Administration's Central Federal Lands Division

Upon the completion of the road and infrastructure surveys by our Forest crews, Central Federal Lands Division (CFL) assessed the damage to maintenance level (ML) 3-5 roads, bridges, and drainage structures and prepared Damage Survey Reports (DSRs) that include repair costs. Most of the roads were field surveyed by CFL with assistance from ARP personnel, although a few roads and bridges were evaluated using remote sensing including video footage from helicopter flights. They completed their assessment and submitted DSRs to the FIAT to inform road restoration decisions. Upon request, CFL will package together some of the engineering contracts for roads and bridges covering both NFS and local county roads.

Left: Damage to Hell Canyon Road on the Canyon Lakes Ranger District

IV. VALUES AT RISK

Values at risk for this assessment were defined as high priority infrastructure (roads, bridges and dams) and facilities on BRD and CLRD outside of wilderness areas. The FIAT assessed only roads that were ML 3-5 and high priority ML 2 roads with the exception of one ML 1 road. Due to time constraints, only a few trails were surveyed. Additional surveys will be needed for the remaining trails.

Below is a summary of the number (or miles) of type and amount of each that were assessed. See Appendices A and B for detailed listings of infrastructure and facilities in Table 7.

Table 7. *Summary of Infrastructure or Facilities Surveyed by the FIAT*

Infrastructure	**Facilities**
o 380 Roads *(covering 557 miles of road)* o 17 Bridges o 10 Trails o 1 Dam	o 5 Administrative Sites o 28 Campgrounds o 28 Picnic Areas o 4 Information/Interpretive Sites o 2 Parking Areas o 57 Trailheads o 4 Boating Access o 10 Fishing Sites o 23 Recreation Residences

Left: Damage to the Kelly Flats Road on the Canyon Lakes Ranger District

V. EXISTING CONDITIONS

Summary of Damage

Damage to infrastructure and facilities ranged from none to total destruction. Roads that received either no damage or minor damage accounted for approximately 67% of the total roads surveyed. Facilities that received either no damage or minor damage accounted for approximately 82% of the facilities surveyed. Only four of 17 bridges surveyed were damaged, although three of the bridges sustained heavy or total damage.

Total preliminary estimated costs for infrastructure and facilities repair are:

- Roads - $10,609,025
- Bridges - $2,784,954
- Trails - $425,693
- Facilities - $3,025,031
- **Estimated Total Costs All – $16,844,703**

These costs are subject to change depending on design, construction and market demand for costs. CFL expects the cost increase and potentially double. Detailed tables of the assessment priorities and costs are in Appendices A and B.

Above: Forest Service Road 348, Winiger Ridge area on the Boulder Ranger District

Damage to Roads and Trails Not Surveyed

Potential damage and cost to repair for trails and lower priority (ML 1 and 2) roads that were not surveyed are included in the damage tables below. These trails and roads were identified by mapping debris slides based on one-half meter post-flood *Satellite Pour l'Observation de la Terre* (SPOT) imagery and comparing it with change detection data. Change detection data was created by comparing satellite imagery from September 28, 2011, with imagery from September 17, 2013. The SPOT image was pulled on September 29, 2013. Surveyed roads with damage ratings of high and very high were buffered by 500 feet because most of the slides ranged in width from 300-500 feet. The slides and road buffers were intersected with trails and roads (not surveyed) meeting the following criteria:

- All existing National Forest System Trails
- Maintenance Level 1 or 2
- Existing National Forest System road
- Any of the above roads that were within 200 meters of a slide or road damage buffer
- If any segment of a road intersected the slide/road buffer, the entire route was selected as having potential damage.

Emergency Relief for Federally Owned Roads (ERFO)

Roads maintained for passenger cars (ML 3-5 and some ML 2) were assessed by Federal Highway Administration – Central Federal Lands (CFL) teams. Damage Survey Reports (DSRs) were prepared for 46 roads and two bridges. The Regional Structural Engineer prepared DSRs for four bridges (including the two bridges done by CFL). The Forest utilized the costs for bridges shown in the DSRs completed by the Regional Structural Engineer.

Roads potentially eligible for ERFO funding include 74 ML 3-5 roads. The Forest intends to apply for ERFO eligibility on additional 10 ML 2 roads because they access private lands and have previously been maintained for travel by passenger car. See Appendix D for a map of ERFO eligible roads.

Damage Summary Tables[2]

Below are damage summary tables by district for infrastructure and facilities. Damage and preliminary estimated cost of repair for specific roads and bridges are listed in Appendix A. Damage and preliminary estimated costs for specific facilities are listed in Appendix B. Also see Appendix C for Map of Flood Impact Assessment and Damage Rating of Infrastructure and Facilities.

Table 8. *Boulder Ranger District Road Damage and Preliminary Estimated Repair Costs*

Maintenance Level	**High Damage**		**Intermediate Damage**		**Low Damage**		**Preliminary Estimated Cost**
	# Roads	Miles	# Roads	Miles	#Roads	Miles	
1-2	6	8.5	28	22.5	6	7.4	$729,847
2 ERFO	1	2.8	2	1.7	0	0	$315,240
3-5 ERFO	24	7.7	9	3.8	21	9.2	$2,633,595
1-2 Not Surveyed	47	44.0	0	0	0	0	$880,000
Total	**78**	**63.0**	**39**	**28.0**	**23**	**16.5**	**$4,558,682**

Table 9. *Canyon Lakes Ranger District Road Damage and Preliminary Estimated Repair Costs*

Maintenance Level	**High Damage**		**Intermediate Damage**		**Low Damage**		**Preliminary Estimated Cost**
	# Roads	Miles	# Roads	Miles	#Roads	Miles	
1-2	30	75.2	11	35.7	9	25.2	$2,575,441
2 ERFO	3	10.7	3	9.5	1	3.4	$1,123,842
3-5 ERFO	9	26.0	2	13.2	13	64.1	$2,111,060
1-2 Not Surveyed	11	12.0	0	0	0	0	$240,000
Total	**53**	**123.9**	**16**	**58.4**	**23**	**92.6**	**$6,050,343**

[2] Preliminary estimated costs are subject to change depending on potential revisions to design, construction costs, and market demand for construction services. Figures may increase or double.

Table 10: *Boulder Ranger District Bridge Damage and Preliminary Estimated Repair Costs*

Number of Bridges	**High Damage**	**Intermediate Damage**	**Low Damage**	**Preliminary Estimated Cost**
1	1	0	0	**$54,392**

Table 11. *Canyon Lakes Ranger District Bridge Damage and Preliminary Estimated Repair Costs*

Number of Bridges	**High Damage**	**Intermediate Damage**	**Low Damage**	**Preliminary Estimated Cost**
3	3	0	0	**$2,730,562**

Table 12: *Boulder Ranger District Trail Damage and Preliminary Estimated Repair Costs*

Trails	**High Damage**		**Intermediate Damage**		**Low Damage**		**Preliminary Estimated Cost**
	# Trails	Miles	# Trails	Miles	#Trails	Miles	
Trails Surveyed	2	2.7	1	0.5	3	20.5	$16,000
Trails not Surveyed	2	2.0	4	5.2	11	45.9	$50,500
Total	**4**	**4.7**	**5**	**5.7**	**14**	**66.4**	**$66,500**

Table 13: *Canyon Lakes Ranger District Trail Damage and Preliminary Estimated Repair Costs*

Trails	**High Damage**		**Intermediate Damage**		**Low Damage**		**Preliminary Estimated Cost**
	# Trails	Miles	# Trails	Miles	#Trails	Miles	
Trails Surveyed	3	12.6	1	3.4	0	0	$63,140
Trails not Surveyed	2	9.5	24	78.2	17	55.8	$296,053
Total	**5**	**22.1**	**25**	**81.6**	**17**	**55.8**	**$359,193**

Table 14. *Boulder Ranger District Facility Damage and Preliminary Estimated Repair Costs*

Site Type	**High Damage**	**Intermediate Damage**	**Low Damage**	**Preliminary Estimated Cost**
Campground	1	2	0	$211,000
Picnic Ground / Day Use	1	0	2	$7,000
Trailhead	3	1	6	$180,531
Fishing Site	1	0	0	$150,000
Total	**6**	**3**	**8**	**$548,531**

Table 15. *Canyon Lakes Ranger District Facility Damage and Preliminary Estimated Repair Costs*

Site Type	High Damage	Intermediate Damage	Low Damage	Preliminary Estimated Cost
Campground	0	1	1	$9,000
Picnic Ground / Day Use	3	1	4	$1,425,000
Trailhead	5	3	0	$417,500
Fishing Site	1	0	0	$250,000
Boating Access	0	0	3	$7,500
Recreation Residence	0	0	2	$15,000
Parking Area	1	0	0	$350,000
Total	**10**	**5**	**10**	**$2,474,000**

Additional Resource Damages

There were additional resources that were impacted by heavy rains and the resulting flood. On CLRD, a large debris slide extending more than two miles was created south of Estes Park, Colo., near Twin Sisters Peaks. Numerous slides occurred in other locations on BRD and CLRD with steep slopes. Some stretches of the North Fork of the Big Thompson River were redirected to a different location. Other water courses of all sizes have been at least altered to some level and/or newly routed in other locations and streambank stability has likely been compromised. Sediment removal and deposits to varying degrees have been exchanged in many locations. Debris dams have formed in some streams such as near the Camp Dick Bridge on BRD. Assessing the number of debris deposits in the streams, along shorelines or other locations on the Forest and associated removal costs were not included in this assessment.

The BRD and CLRD have 235 trails totaling 493 miles. There are 159 trails totaling 246 miles located outside of Wilderness areas. Only ten of these trails were surveyed by the FIAT. Seventy of these trails are within 200m of a high or very high damage-rated road or slide. It is likely that portions of these trails have some damage. Surveys are needed to determine the damage and repair costs to these trails and trails within the Wilderness that may also be affected. Impacts to trails and other resource areas still need to be evaluated and were not part of the assessment.

Above: The Twin Sisters debris slide in the Pierson Park area on the Canyon Lakes Ranger District. The slide runs from Twin Sisters Peaks to the Pierson Park area and is located on both NFS and private lands.

Resource Program Impacts

All programs on the eastside of the Forest will most likely be impacted to some level following the flood event. Table 16 displays a summary of immediate impacts to the resource programs.

Table 16. *Potential Flood Impacts by Resource Area*

Resource Area	Impact
Archaeology	o Existing sites may have been impacted (i.e. buried with sediment or moved). o New sites may have been exposed.
Botany	o Impacts unknown
Boundary Management	o Boundary markers may have moved or been destroyed. o As boundaries are re-established new encroachments may be discovered that will need resolution.
Engineering	o Workload has been increased to restore damaged or destroyed facilities, roads, bridges and other infrastructure. o Some existing contracts may need to be suspended due to wet conditions.
Fire	o Emergency response vehicle access routes are destroyed in some areas where high value improvements are still intact. Emergency response time will be delayed in areas that roads are damaged or destroyed and unreachable except by long hikes or helicopter. o Existing ground based fire assets may need to be reconfigured to match the new landscape (i.e. need for helicopter module). o Winter burn program may need to be modified due to lack of access.
Fisheries	o Stream courses were impacted from scouring and rerouting, which may modify fish habitat. o On some roads, culverts that provide aquatic organism passage were damaged, plugged, or in some cases, washed away. o Habitat for TE&S species (i.e. greenback cutthroat trout) were probably heavily impacted by the flooding event. o Emergency consultation with Fish and Wildlife Service will need to be initiated.
Hydrology/Soils	o Workload will be increased to stabilize roads and debris flows in the flooded area. o There will be a need to identify and restore streams and other drainages where streambank stability has been compromised. o The Fourmile, Hewlett, and High Park Fires will need to be monitored to determine the effects from the flood and plan future Burned Area Emergency Response if needed.

Resource Area	Impact
Lands	o Requests for special use permits will increase. Landowners will need to repair or re-route access roads to their property or businesses and portions of the State, Federal and counties roads may potentially need re-routing across NFS lands due to the changed course of rivers and streams. o Increased Small Tracts Act and other workload to address encroachments for rebuilding efforts. o Responding to lands issues within the flooded area may delay other land responses to partners (i.e. communication tower permit). o Increased interest in new research projects in the flooded area will increase workload to issue permits.
Law Enforcement	o Emergency response routes may be compromised due to vehicle access constraints. Delayed emergency response time can be expected. o Additional workload to enforce post flood closure orders as the order is expanded and contracted overtime.
Minerals	o Patented and abandoned mines might have varying degrees of damage and impacts.
Noxious Weeds	o Newly disturbed ground may allow noxious weed populations to spread. o Throughout the implementation phase, fill material that is brought in to repair roads and other infrastructure may contain noxious weed seed and create new areas of concern.
Range	o Impacts unknown
Recreation	o Flood closure areas have re-directed recreationists to different locations; some campgrounds, picnic areas, trailheads, and trails have been closed. o Damage to facilities, infrastructure, and trails still need to be evaluated in some areas. o Special Use Permits – Summer Home Groups and the roads accessing them in some areas have been impacted. o Visitor Information Specialists will receive additional calls about the flood event and what areas are open for recreation.
Vegetation Management	o Some contracts have been suspended due to the wet conditions. o Preparation for next year's contracts may be limited or priorities may be modified due to lack of access. o Obligations with Long Term Stewardship, Denver Water, CFLRP, XCEL, and CDOT still need to be met.

Resource Area	Impact
Wildlife	o Habitat for TE&S species (i.e. Prebles meadow jumping mouse) were probably heavily impacted by the flooding event. o Emergency consultation with Fish and Wildlife Service will need to be initiated.
Partnerships/ Volunteers	o Increased interest in volunteer opportunities and partnerships to restore popular areas will need to be evaluated and addressed.

External Impacts

The damage to NFS lands, infrastructure and facilities also has impact to contractors, partners, volunteers, visitors and the economy as shown in Table 17.

Table 17. *Impacts to Contractors, Partners and Visitors*

Area	Impact
Economics	o The campground concessionaires, outfitter-guides and other special use permitees and contractors have been impacted to some level by flooding related closures and access issues. o Road, infrastructure and facilities outside of the flood impacted areas that are in need of repair may be delayed due to funding or capacity limitations. o There will be additional time and cost for field going employees to reach their work sites because of flood impacted routes.
Events	o Some events have been cancelled or postponed due to the flood impacts. On the BRD, the open house event for the sale of the Rollinsville Work Center and the Colorado State Forestry Fair were postponed due to timing of the flood. National Public Lands Day was cancelled on BRD and postponed on CLRD.
Partners/Volunteers	o Traditional work in the flooded area by volunteers and partners is not occurring. Some recent work in some areas by partners and volunteers was destroyed such as the repairs to the Young Gulch Trail on CLRD.
Visitor Impacts	o Forest Service roads and trails which provide access to a wide variety of activities are damaged or destroyed as well as State and Federal highways and the county road system leading to them. o Some areas such as Lefthand OHV site has a lot of damage and is displacing both recreational sports shooting activities and OHV use. o Hunting season is underway and many popular areas are within the closed and inaccessible area. o Fall color viewing was impacted. o Bicycling and mountain bike routes were impacted by road and trail damage.

Effects on Existing Contracts/Programs/Targets

Targets associated through contract work have been met upon award of the contract. Due to the timing of the flood event in proximity to the fiscal year, targets accomplished through force account crews or other means were probably met or not, but the flood event most likely did not impact too many last minute projects in regard to target accomplishment. Contracts affected by the flood event are displayed in Tables 18 through 20.

Table 18. *Front Range Long Term Stewardship Contracts Impacted by the Flood Event*

Contract	District	Action	Comments
CLRD Roadside Hazard Tree 2012	CLRD	Suspended	Wet roads
Thompson River 2 Piling	CLRD	Suspended	No access
Red Feather 2	CLRD	Suspended	Road damage / wet roads
Creedmore (2014)	CLRD	Potential Delay	Road damage
South Winiger	BRD	Suspended	Wet roads
South Zone Chipping	BRD	Potential Delay	Road damage
Ward Jam 2014	BRD	Potential Delay	Road damage
Boiler 2014	BRD	Potential Delay	Road damage

Table 19. *Timber Sales Contracts Impacted by the Flood Event*

Contract	District	Action	Comments
Panhandle	CLRD	Suspended	Wet roads
Pearl Cache	CLRD	Suspended	Road reconstruction allowed
Deadhorse Mountain (2014)	CLRD	Potential Delay	Road damage
Pratt Creek (2014)	CLRD	Potential Delay	Road damage

Table 20. *Other Contracts Impacted by the Flood Event*

Contract	District	Action	Comments
Cherokee Park Stand Exam	CLRD	Not suspended	Delay inspections - wet roads
Road Decommissioning	CLRD	Suspended	Access / Wet roads
FSR 152 BAER Reconstruction	CLRD	Suspended	Access / Damage / Wet roads
Baker Draw Shooting Area	PNG	Suspended	Wet roads
SZ Cone Collection	BRD	Completed	Contract was suspended during the flood event; now completed
Road Maintenance	BRD	Suspended	Access / Wet roads
Jenny Creek Stream/Road Imp.	BRD	Suspended	Wet roads

Emergency Created Roads

New routes have been created across portions of NFS lands to facilitate rescue and recovery access. Some routes have been created by residents trying to establish alternative access to their private property in areas where there normal access route from State and Federal highways and county roads have been destroyed. This has resulted in existing primitive roads being changed to accommodate a different type of use or new roads being created where access routes and roads did not exist on NFS land in the past. In some of these areas there may be severe resource damage that will need to be addressed. A few communities may request permanent alternate routes across NFS lands.

Left: Damage to the Taylor Mountain Road, (National Forest System Road 330) on the Boulder Ranger District

VI. RESTORATION AND RECOVERY RECOMMENDATIONS

Prioritization of Areas or Projects

The FIAT prioritized the repair, restoration and recovery of damaged infrastructure and facilities using the scale below:

1. Repair immediately for health and safety
2. Repair soon to avoid more costly repairs later
3. Repair can wait/other resource considerations

The priorities for repair of specific roads and bridges are listed in Appendix A. The priorities for repair of individual facilities are listed in Appendix B

Next Steps

Ongoing Safety Issues

The closure areas will be dynamic for the two ranger districts and will be adjusted as infrastructure and facilities are repaired or restored and areas become safe to enter. As areas open it will be important to remind visitors that their safety is their responsibility and conditions in the flooded and other areas on the Forest can change at any time.

Some ongoing potential hazards to monitor over time include:

1. Infrastructure and facilities work will continue for many years and the specific work areas will pose their own safety hazards, with heavy equipment, restricted routes, etc. as work is completed.
2. Plugged or damaged culverts could lead to further road damage. Further assessment and repair of road culverts is needed to avert damage to infrastructure and other resources.
3. Trees weakened from the storm's impact combined with the high winds associated with the area will result in windthrown trees. Similar to the mountain pine beetle, visitors should be aware of the locations for vehicle parking, campsites, and the trails they hike or bike in forested areas.
4. Until the traditional road system is replaced or repaired emergency response in the flooded areas may be delayed.
5. Soils have become over-saturated and any additional rain/snow could create additional landslides, rockslides, and flash flooding. Initially, it may not take a big storm to cause severe impacts due to the over-saturated soils.
6. Frost weathering (freezing and thawing) may cause dislodging of mineral grains or fracturing boulders. During winter, frost weathering events may weaken rocks that could fall on roadways and additional ARP infrastructure and may become a safety issue in rock climbing areas.
7. Debris dams may become more evident as a result of the new conditions existing in the stream channels. Weakened root systems of vegetation exposed from this flood event and future storms may loosen and flow through stream channels causing both periodic and permanent debris dams. This could result in downstream flooding and further erosion by the overflow stream.

8. Loosened vegetative debris may culminate near culverts and should be monitored to maintain proper flow and minimize road damage.

Repair Mechanisms

There will be a variety of options available to move forward into the implementation phase of the flood event. Procurement and contracting will be the most common mechanism to complete the restoration and recovery effort on the Forest. A variety of new contracts will need to be developed in addition to the current Indefinite Delivery, Indefinite Quantity (IDIQ) contracts. Some road maintenance task orders to existing IDIQ contracts have been awarded on the respective ranger districts and the work to be completed can be re-prioritized to address specific high impacted areas (limited by the equipment they have). Upon request CFL may package together some of the engineering contracts for roads and bridges covering both NFS and local county roads.

Micro-purchases for small restoration and recovery projects may be the most efficient instrument to complete the work. Our local force account crews can be directed to complete work within their capabilities, and both ranger districts have some light machinery that can be utilized to assist in this effort. Extended force account crews (i.e. Black Hills or Medicine Bow Routt National Forests Road Maintenance Crew) may be available to assist with projects as well.

Grants and agreements may be pursued to assist with the recovery and restoration effort. Opportunities may also be available to utilize inmate crews, civilian conservation crews, and adjacent county resources that were not directly impacted by the flood event.

Determine Needs

This assessment report is intended to provide a snapshot of the existing conditions across the impacted areas. It does not include every road, infrastructure, or facility within the area and as areas open and time allows, further evaluations are recommended. As the ARP transitions from the rapid assessment to the repair, rehabilitation and recovery phase, it anticipates the need for an organization that can add capacity to the forest to address the immediate, short-term and long-term stabilization, repair and rehabilitation needs; evaluate additional BAER needs in the High Park and Fourmile fire areas; and handle the expected demand for Lands and Special Use requests necessary to help facilitate rebuilding and restoring access to private lands within the boundaries. These needs include additional capacity to quickly:

- Determine the planning and regulatory framework to make flood response, rehabilitation and repair decisions.
- Assess damage and restore fisheries, watersheds, wildlife habitat, archeological sites, range, trails and other resources that were impacted.
- Resolve complex lands, special uses and boundary management cases.
- Assess volunteer, partnership, grants and other funding and staffing opportunities.
- Integrate ARP work with three counties, utilities, state and other Federal entities.
- Handle a large complex procurement, contracting, grants and agreements workload.

- Fund the needed work as a separate allocation from the ARP's regular program of work.
- Communicate effectively with a wide variety of stakeholders including state, local and Federal elected officials and agencies, contractors, permit holders, recreation users and internal audiences.

The landscape has changed and many areas are temporarily inaccessible until repair and rehabilitation efforts are completed. Recovery from the flood event will take several years, additional funding and resources to address. Not all high priority infrastructure and facilities can be repaired in one year. In addition some damaged infrastructure and facilities will be evaluated further to determine whether it is appropriate to be repaired, reestablished or decommissioned.

Above: Damage to Young Gulch Trail located in Poudre Canyon on the Canyon Lakes Ranger District

APPENDICES

APPENDIX A. INFRASTRUCTURE REPAIR PRIORITIES

Cost Footnote[3] Trails Footnote[4]

Table A 1. Boulder Ranger District Surveyed Roads and Trails List

ROAD/TRAIL NAME (BRD)	FS Mileage	RTE NO	OPML	Damage Rating	Repair Needed?	ERFO Eligible?	Preliminary Estimated Cost	Priority High=9 Med=6 Low<6
BALARAT ROAD	0.51	87.0	3	Very High	Yes	Yes	$354,029	9
BEAVER RESERVOIR	1.11	96.0	3	High	Yes	Yes	$109,008	9
BOULDER COUNTY 100	0.42	100	4	High	Yes	Yes	$352,510	9
GOLD LAKE ROAD	2.06	102.0	4	High	Yes	Yes	$71,713	9
BUNCE SCHOOL	2.78	105.0	2	High	Yes	Private access	$286,440	9
S ST VRAIN PG 2 MP 29.5	0.07	150.2	3	Very High	Yes	Yes	$3,755	9
S ST VRAIN PG 3 MP 28.9	0.08	150.3	3	Very High	Yes	Yes	$4,541	9
S ST VRAIN PG 4 MP 27.1	0.09	150.4	3	Very High	Yes	Yes	$4,713	9
S ST VRAIN PG 5 MP 25.6	0.09	150.5	4	Very High	Yes	Yes	$75,983	9
CASTLE GULCH	1.33	287.1	2	Very High	Yes	No	$26,664	9
NORTH GILLESPIE	0.24	327.1	3	Very High	Yes	Yes	$13,152	9
TAYLOR MOUNTAIN	1.66	330.1	2	Very High	Yes	No	$33,207	9
GILLESPIE GULCH	1.67	331.1	3	Very High	Yes	Yes	$220,439	9
GROUSSMAN	0.78	368.1	3	High	Yes	Yes	$286,440	9

[3] Preliminary estimated costs are subject to change depending on potential revisions to design, construction costs, and market demand for construction services. Figures may increase or double.

[4] These tables only include the trails and roads that were surveyed by the assessment team and not trails that damage was estimate using the process on page16

ROAD/TRAIL NAME (BRD)	FS Mileage	RTE NO	OPML	Damage Rating	Repair Needed?	ERFO Eligible?	Preliminary Estimated Cost	Priority High=9 Med=6 Low<6
JAMES CANYON DR NORTH	3.27	102J.0N	2	High	Yes	No	$65,490	9
S ST VRAIN PULLOFF MP 26.3	0.07	150.4B	3	Very High	Yes	Yes	$130,338	9
S ST VRAIN PULLOFF MP 25.8	0.09	150.4C	3	Very High	Yes	Yes	$325,778	9
S ST VRAIN PULLOFF MP 25.2	0.06	150.6A	3	Very High	Yes	Yes	$3,180	9
S ST VRAIN PULLOFF MP 24.8	0.06	150.6B	3	Very High	Yes	Yes	$19,032	9
S ST VRAIN PULLOFF MP 24.5	0.09	150.6C	3	Very High	Yes	Yes	$4,755	9
S ST VRAIN PULLOFF MP 24.3	0	150.7A	3	Very High	Yes	Yes	$0	9
S ST VRAIN PULLOFF MP 24.1	0.03	150.7B	3	Very High	Yes	Yes	$50,554	9
S ST VRAIN PULLOFF MP 23.9	0	150.7C	3	Very High	Yes	Yes	$0	9
S ST VRAIN PG 8 MP 22.8	0.04	150.7E	3	Very High	Yes	Yes	$2,175	9
MOOREHEAD GULCH SPUR	0.05	280.1B	3	Very High	Yes	Yes	$2,702	9
NORTH GILLESPIE SPUR	0.03	327.1A	3	Very High	Yes	Yes	$1,908	9
EMERY ROAD	0.81	104.1	3	Intermediate	Yes	Yes	$21,000	6
MEEKER PARK PG	0.07	121.0	4	Intermediate	Yes	Yes	$3,908	6
MEEKER PARK OVERFLOW	0.24	122.0	3	Intermediate	Yes	Yes	$18,478	6
S ST VRAIN PG 7 MP 23.7	0	150.7	3	Very High	Yes	Yes	$0	6
CONIFER HILL	1.45	185.1	2,3	Intermediate	Yes	Yes	$14,784	6
DRY ST. VRAIN	0.26	200.1	2	High	Yes	No	$5,149	6
ST. VRAIN OVERLOOK	0.11	212.1	2	Intermediate	Yes	No	$2,190	6

ROAD/TRAIL NAME (BRD)	FS Mileage	RTE NO	OPML	Damage Rating	Repair Needed?	ERFO Eligible?	Preliminary Estimated Cost	Priority High=9 Med=6 Low<6
LEFTHAND	3.00	286.1	2	Intermediate	Yes	No	$59,961	6
EAST GOLDEN AGE	0.60	288.1	2	Intermediate	Yes	No	$12,074	6
FOURMILE CREEK	0.88	328.1	2	Intermediate	Yes	Private access	$18,300	6
OFF LAZY 2	2	349.1	1	High	Yes	No	$110,000	6
BOY SCOUT	1.22	357.1	2	Intermediate	Yes	No	$7,700	6
WINIGER RIDGE	2.68	359.1	2	Intermediate	Yes	No	$36,600	6
GOLD LAKE	1.73	372.1	2	Intermediate	Yes	No	$34,575	6
STAPP LAKES	0.33	508.1	3	Intermediate	Yes	Yes	$5,569	6
BOULDER COUNTY 126N	0.73	126N.0	4	Intermediate	Yes	Yes	$39,980	6
	1.47	286.1D	2	Intermediate	Yes	No	$29,327	6
CASTLE GULCH SPUR	0.47	287.1A	2	Intermediate	Yes	No	$9,370	6
CASTLE GULCH SPUR	1.18	287.1B	2	Intermediate	Yes	No	$23,536	6
EAST GOLDEN AGE SPUR	0.45	288.1A	2	Intermediate	Yes	No	$9,074	6
MATCHLESS	0.83	314.1A	2	Intermediate	Yes	Private access	$10,500	6
BOULDER COUNTY 126	0.02	126.0	4	Intermediate	Yes	Yes	$1,130	4
S ST VRAIN PG 6 MP 25.5	0.11	150.6	4	Intermediate	Yes	Yes	$3,221	4
CAVE CREEK	0.79	217.1	2	Intermediate	Yes	No	$15,895	4
JAMES CANYON DR SOUTH	2.19	102J.0S	2	Intermediate	Yes	No	$43,853	4
LEFTHAND SPUR	0.81	286.1B	2	Intermediate	Yes	No	$16,149	4

ROAD/TRAIL NAME (BRD)	FS Mileage	RTE NO	OPML	Damage Rating	Repair Needed?	ERFO Eligible?	Preliminary Estimated Cost	Priority High=9 Med=6 Low<6
LOWER RIDGE	0.62	286.1C	2	Intermediate	Yes	No	$12,397	4
UPPER CREEK	0.76	286.1E	2	Intermediate	Yes	No	$15,111	4
ROCKCRAWL	0.44	286.1G	2	Intermediate	Yes	No	$8,800	4
FAIRVIEW VIEW	0.43	286.1H	2	Intermediate	Yes	No	$8,637	4
CASTLE GULCH SPUR	0.35	287.1C	2	Intermediate	Yes	No	$6,927	4
CASTLE GULCH SPUR	0.23	287.1D	2	Intermediate	Yes	No	$4,557	4
EAST GOLDEN AGE SPUR	0.33	288.1B	2	Intermediate	Yes	No	$6,690	4
EAST GOLDEN AGE SPUR	0.25	288.1D	2	Intermediate	Yes	No	$4,947	4
GOLD LAKE SPUR	0.21	372.1B	2	Intermediate	Yes	No	$4,213	4
MID ST VRAIN	1.21	114.1	3	Low	Yes	Yes	$66,788	3
RAINBOW LAKES	3.13	116.0	3	Low	Yes	Yes	$171,886	3
ROCK CREEK	3.267	116.2	2	Low	Yes	No	$32,670	3
MOUNT ALTO PG	0.05	151.1	2	Low	Yes	No	$539	3
OLIVE RIDGE CG	0.49	211	3	Low	Yes	Yes	$27,036	3
SNEEZEWEED	0.09	211.1	3	Low	Yes	Yes	$4,722	3
DIPPER	0.32	211.2	3	Low	Yes	Yes	$17,472	3
	0.08	211.3	3	Low	Yes	Yes	$4,609	3
LA BELLE ROAD	0.41	219.1	3	Low	Yes	Yes	$22,439	3
MEEKER PARK SH GROUP	0.23	229.1	3	Low	Yes	Yes	$9,800	3

ROAD/TRAIL NAME (BRD)	FS Mileage	RTE NO	OPML	Damage Rating	Repair Needed?	ERFO Eligible?	Preliminary Estimated Cost	Priority High=9 Med=6 Low<6
MEEKER PARK NORTH	0.25	231.2	3	Low	Yes	Yes	$2,700	3
GOLDEN AGE	0.94	284.1	3	Low	Yes	Yes	$5,338	3
MANCHESTER LAKE	0.34	360.1	4	Low	Yes	Yes	$18,699	3
LA CHULA	0.67	364.1	2	Low	Yes	No	$6,748	3
LEFTHAND TURNOUT	0.12	621.1	3	Very High	Yes	Yes	$160,731	3
RAINBOW LAKES CG LOOP A	0.05	116.4A	3	Low	Yes	Yes	$2,500	3
BOULDER COUNTY 126S	0.20	126S.0	4	Low	Yes	Yes	$10,883	3
WEST MAGNOLIA	1.17	132.W	3	Low	Yes	Yes	$64,144	3
MEEKER PARK SH SPUR	0.08	229.1A	3	Low	Yes	Yes	$4,434	3
MEEKER PARK SUMMER HOME GROUP	0.09	231.2A	3	Low	Yes	Yes	$4,937	3
BEAVER BOG	1.28	507.1E	2	Low	Yes	No	$12,839	3
GARNET SPUR	0.95	226.1	2	Low	Yes	No	$9,464	2
OBSERVATORY	1.15	355.1	2	Low	Yes	No	$11,465	2
BOULDER CANYON TURNOUT	0.04	622.1	3	Intermediate	Yes	Yes	$1,313	2
RAINBOW LAKES CG LOOP B	0.09	116.4B	3	Low	Yes	Yes	$5,061	2
CAVE CREEK SPUR	0.47	217.1A	2	Intermediate	Yes	No	$9,478	2
CAVE CREEK SPUR	0.27	217.1C	2	Intermediate	Yes	No	$5,317	2
CAVE CREEK SPUR	0.15	217.1D	2	Intermediate	Yes	No	$3,014	2
LOWER CREEK	0.95	286.1A	2	Intermediate	Yes	No	$19,007	2

ROAD/TRAIL NAME (BRD)	FS Mileage	RTE NO	OPML	Damage Rating	Repair Needed?	ERFO Eligible?	Preliminary Estimated Cost	Priority High=9 Med=6 Low<6
FOURMILE CREEK SPUR	0.26	328.1A	2	Intermediate	Yes	No	$5,265	2
CAVE CREEK SPUR	0.05	217.1B	2	Intermediate	Yes	No	$945	0
CERAN ST. VRAIN	1.9	801	Trail	High	Yes	No	$7,500	6
BUCHANAN PASS	19.7	910	Trail	Low	Yes	No	$2,000	6
LEFTHAND OHV	0.3	843	Trail	High	Yes	No	$1,000	6
LEFTHAND OHV	0.5	843.A	Trail	Low	Yes	No	$1,000	6
LEFTHAND OHV	0.5	843.B	Trail	Low	Yes	No	$1,500	6
LEFTHAND OHV	0.8	844	Trail	High	Yes	No	$3,000	6
TOTAL – BOULDER R.D.							**$3,694,683**	

Table A 2. Canyon Lakes Ranger District Surveyed Road and Trail List

ROAD/TRAIL NAME (CLRD)	FS Mileage	RTE NO	ML	Damage Rating	Repair Needed?	ERFO Eligible?	Preliminary Estimated Cost	Priority High=9 Med=6 Low<6
WHITE PINE LOOKOUT	2.61	100.0	2	Very High	Yes	No	$52,147	9
DUNRAVEN	0.79	104.0	3	Very High	Yes	Yes	$43,350	9
JOHNNY PARK	5.16	118.0	2	High	Yes	No	$103,241	9
BUTTON ROCK B	1.76	118.1	2	High	Yes	No	$35,272	9
PIERSON PARK	8.15	119.0	2	Very High	Yes	No	$83,578	9
POLE HILL	3.15	122.0	2	High	Yes	Private access	$460,648	9

ROAD/TRAIL NAME (CLRD)	FS Mileage	RTE NO	ML	Damage Rating	Repair Needed?	ERFO Eligible?	Preliminary Estimated Cost	Priority High=9 Med=6 Low<6
HELL CANYON	5.75	123.0	2	Very High	Yes	Private access	$368,079	9
CEDAR PARK	3.59	128.0	3/2	Very High	Yes	Yes	$803,913	9
FLOWERS	12.75	152.0	2/3	Very High	Yes	Yes (East)	$50,859	9
WINTERSTEEN PARK. KELLY FLATS	8.01	168.0	2	Very High	Yes	No	$160,131	9
CHICKEN PARK	4.90	181.0	2	High	Yes	No	$98,000	9
7 MILE	5.09	225.0	2	Very High	Yes	No	$101,809	9
PANORAMA PEAK	1.85	247.0	2	High	Yes	No	$37,097	9
PANORAMA OVERLOOK	0.20	247.2	2	High	Yes	No	$3,918	9
N LONE PINE CREEK	4.60	311.0	2	High	Yes	No	$91,937	9
COYOTE HILL	1.07	325.0	2	High	Yes	No	$21,435	9
CRYSTAL MOUNTAIN	3.18	344.0	3/2	High	Yes	Yes	$45,368	9
STRINGTOWN GULCH	5.40	345.0	3/2	High	Yes	Yes	$103,767	9
PIERSON PARK SPUR D	1.69	119.D	2	Very High	Yes	No	$33,749	9
PIERSON PARK SPUR E	1.01	119.E	2	Very High	Yes	No	$20,157	9
	0.22	119.EE	2	Very High	Yes	No	$4,412	9
PIERSON PARK SPUR F	0.25	119.F	2	Very High	Yes	No	$4,954	9
PIERSON PARK SPUR G	0.28	119.G	2	Very High	Yes	No	$5,515	9
PIERSON PARK SPUR H	0.10	119.H	2	Very High	Yes	No	$1,905	9
SOLITUDE CREEK	1.50	122.A	2	High	Yes	No	$29,986	9

ROAD/TRAIL NAME (CLRD)	FS Mileage	RTE NO	ML	Damage Rating	Repair Needed?	ERFO Eligible?	Preliminary Estimated Cost	Priority High=9 Med=6 Low<6
BALLARD SPUR	1.83	129.A	2	Very High	Yes	No	$36,617	9
STORM MOUNTAIN BRANCH E	0.85	153.E	2	High	Yes	No	$17,042	9
STORM MOUNTAIN SPUR F	0.45	153.F	2	High	Yes	No	$8,957	9
NORTH CHICKEN PARK	1.73	181.A	2	High	Yes	No	$34,591	9
	1.20	181.D	2	High	Yes	No	$23,931	9
PANORAMA PEAK SPUR A	1.09	247.A	2	High	Yes	No	$21,841	9
PANORAMA PEAK SPUR B	0.35	247.C	2	High	Yes	No	$7,069	9
CAMAAN SPRINGS ROAD	1.71	127.0	2	Intermediate	Yes	No	$34,298	6
BALLARD ROAD	3.31	129.0	2	Intermediate	Yes	Private access	$6,369	6
MONUMENT GULCH	1.82	135.0	2	Very High	Yes	Private access	$225,567	6
COMANCHE	3.13	145.0	2	Intermediate	Yes	Private access	$30,214	6
STORM MOUNTAIN ACCESS	10.09	153.0	2	High	Yes	No	$201,750	6
GREER	5.08	154.0	2	Intermediate	Yes	No	$101,525	6
LONG DRAW	13.08	156.0	3	Intermediate	Yes	Yes	$209,664	6
MANHATTAN – SWAMP CREEK	3.73	171.0	2	Intermediate	Yes	No	$74,609	6
GREEN RIDGE CUTOFF	14.63	177.0	2	Intermediate	Yes	No	$292,564	6
GLEN HAVEN PA	0.04	205.0	4/2	Very High	Yes	Yes	$2,458	6
LOWER NORTH FORK PA	0.06	208.0	4	Very High	Yes	Yes	$3,118	6
YOUNG GULCH TRAIL HEAD	0.13	215.1	4	High	Yes	Yes	$83,827	6

ROAD/TRAIL NAME (CLRD)	FS Mileage	RTE NO	ML	Damage Rating	Repair Needed?	ERFO Eligible?	Preliminary Estimated Cost	Priority High=9 Med=6 Low<6
UPPER NORTH FORK PG	0.09	221.0	4	Very High	Yes	Yes	$4,987	6
RABBIT GULCH	3.47	320.0	2	High	Yes	No	$69,356	6
NIXON PARK	2.39	324.0	2	High	Yes	No	$47,760	6
PARACHUTE HILL	1.41	329.0	2	Intermediate	Yes	No	$28,245	6
EIGER ROAD	3.08	339.0	2	Intermediate	Yes	Private access	$26,835	6
TEXAS CUT	1.73	407.0	2	Intermediate	Yes	No	$34,697	6
	0.18	127.B	2	Intermediate	Yes	No	$3,651	6
FOGGY PARK	2.78	153.B	2	High	Yes	No	$55,594	6
GREER SPUR B	0.77	154.B	2	Intermediate	Yes	No	$15,445	6
GREER ROAD SPUR C	2.37	154.C	2	Intermediate	Yes	No	$47,330	6
CREEDMORE LAKES ROAD	0.13	180.C	3	Intermediate	Yes	Yes	$19,796	6
OFF PIERSON PARK	0.51	325.A	2	High	Yes	No	$10,280	6
RATVILLE	1.50	350.0	2	Intermediate	Yes	No	$6,429	4
MOODY HILL	2.57	513.0	2	Intermediate	Yes	No	$51,347	4
GREEN PIG – UPPER MOODY	3.36	132.0	2	Low	Yes	Private access	$6,130	3
CROWN POINT	18.20	139.0	3	Low	Yes	Yes	$10,390	3
GRACE CREEK	3.79	143.0	3	Low	Yes	Yes	$208,492	3
GRACE CREEK	7.08	143.1	2	Low	Yes	No	$70,820	3
TRAP LAKE TH	0.10	148.1	3	Low	Yes	Yes	$5,720	3

ROAD/TRAIL NAME (CLRD)	FS Mileage	RTE NO	ML	Damage Rating	Repair Needed?	ERFO Eligible?	Preliminary Estimated Cost	Priority High=9 Med=6 Low<6
PINKHAM CREEK	2.30	157.0	3	Low	Yes	Yes	$126,561	3
BELLAIRE LAKE DAYUSE	0.72	163.0	4	Low	Yes	Yes	$39,771	3
PEARL BEAVER	11.88	169.0	3	Low	Yes	Yes	$22,542	3
PRATT CREEK	10.50	182.0	3	Low	Yes	Yes	$2,196	3
KINGS CANYON	1.23	204.0	3	Low	Yes	Yes	$67,800	3
LOST LAKE	1.24	235.0	3	Low	Yes	Yes	$68,030	3
MOLLY LAKE	6.43	267.0	4/2	Low	Yes	Yes	$353,559	3
GREEN RIDGE RD	6.91	319.0	3	Low	Yes	Yes	$2,196	3
HURLEY – UPPER BUCKHORN	1.77	352.0	2	Low	Yes	No	$17,656	3
BOSWELL	0.75	526.0	3	Low	Yes	Yes	$41,305	3
	3.51	143.1B	2	Low	Yes	No	$35,145	3
	2.42	143.1C	2	Low	Yes	No	$24,228	3
	0.28	171.E	2	Low	Yes	No	$2,760	3
SITE #30	0.03	69.A	2	Low	Yes	No	$278	3
BENNETT CREEK PG	0.02	160.0	3	Low	Yes	Yes	$1,055	2
	5.10	202.0	2	Low	Yes	No	$50,970	2
	3.66	203.0	2	Low	Yes	No	$36,600	2
MINERAL SPRINGS	1.31	268.0	2	Low	Yes	No	$13,149	2
NORTH FORK	4.3	929	Trail	High	Yes	No	$16,275	6

ROAD/TRAIL NAME (CLRD)	FS Mileage	RTE NO	ML	Damage Rating	Repair Needed?	ERFO Eligible?	Preliminary Estimated Cost	Priority High=9 Med=6 Low<6
HOMESTEAD MEADOWS	3.4	971	Trail	Intermediate	Yes	No	$7,740	6
LION GULCH	3.4	949	Trail	High	Yes	No	$12,750	6
YOUNG GULCH	4.9	999	Trail	High	Yes	No	$18,375	6
TOTAL CANYON LAKES R.D.							**$5,865,483**	

Table A 3. Boulder Ranger District Bridge List

ROAD NAME (BRD)	RTE NO	OPML	Damage Rating	Repair Needed?	ERFO Eligible?	Preliminary Estimated Cost	Priority High=9 Med=6 Low<6
MID ST VRAIN	114.1	3	High	Yes	Yes	$54,392	9
TOTAL BOULDER R.D.						**$54,392**	

Table A 4. Canyon Lakes Ranger District Bridge List

ROAD NAME	RTE NO	OPML	Damage Rating	Repair Needed?	ERFO Eligible?	Preliminary Estimated Cost	Priority High=9 Med=6 Low<6
CEDAR PARK	128.0	3	Very High	Yes	Yes	$1,234524	9
GLEN HAVEN PG	205.0	3	Very High	Yes	Yes	$734,268	6
UPPER NORTH FORK PG	221.0	3	Very High	Yes	Yes	$50,000	6
TOTAL CANYON LAKES R.D.						**$2,018,792**	

APPENDIX B. FACILITY REPAIR PRIORITIES

Footnote[5]

Table B1. Boulder Ranger District Facilities List

SITE NAME (BRD)	Site Type	Water System	Toilets	Damage Rating	Preliminary Estimated Cost	Priority High = 1-2 Med = 3-4 Low >4
HIGHWAY 7 OUTHOUSE FISHING SITE/SOUTH ST. VRAIN # 6 PICNIC	Fishing Site	None	Not Sure	Very High	$150,000	1
CAMP DICK	Campground	Not Inspected	Not Functional	High	$200,000	1
CERAN ST. VRAIN TH	Trailhead	None	None	Low	$4,000	3
MEEKER CAMPGROUND	Campground	None	None	Intermediate	$3,000	1
OLIVE RIDGE	Campground	Not Inspected	Functional	Intermediate	$8,000	1
DRY ST. VRAIN TH	Trailhead	None	None	High	$800	3
FRONT RANGE TH	Trailhead	None	None	Low	$2,000	3
MEEKER PICNIC GROUND	Picnic Site	None	Functional	Low	$2,000	2
MOUNT ALTO DAY USE	Picnic Site	N/A	N/A	Low	$5,000	2
BUCHANAN PASS TH	Trailhead	None	None	Low	$1,000	3
FORSYTHE TH	Trailhead	None	Functional	Low	$8,000	3
SOURDOUGH TH (COUNTY ROAD 96, RAINBOW LAKES ROAD, BRAINARD)	Trailhead	none	Functional		$1,500	3
ST. VRAIN MOUNTAIN TH	Trailhead	None	None	Low	$1,000	3

[5] Preliminary estimated costs are subject to change depending on potential revisions to design, construction costs, and market demand for construction services. Figures may increase or double.

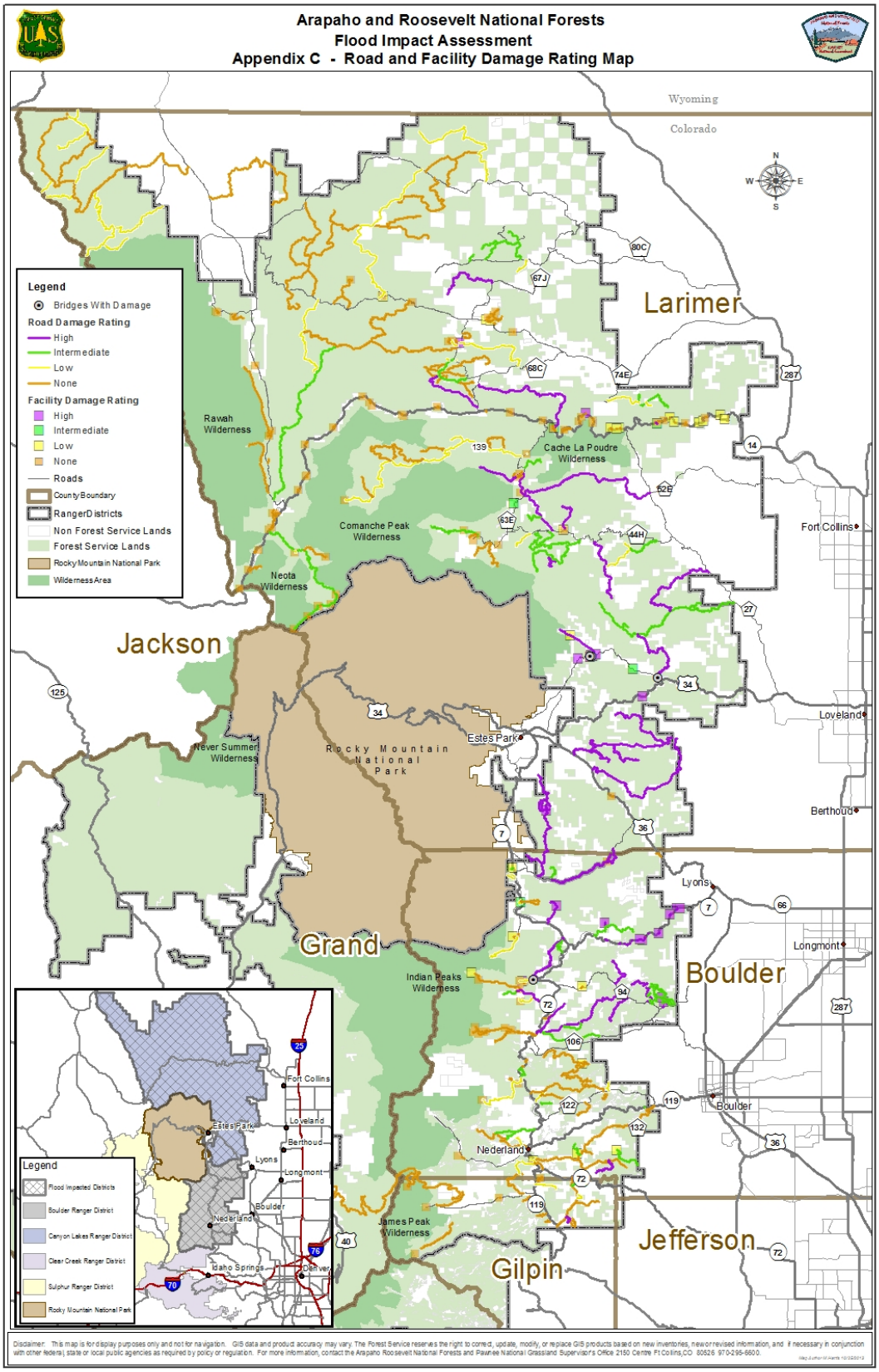
SITE NAME (BRD)	Site Type	Water System	Toilets	Damage Rating	Preliminary Estimated Cost	Priority High = 1-2 Med = 3-4 Low >4
JENNY CREEK TRAIL	**Trailhead**	**None**	**None**		**$0**	
LEFTHAND CANYON OHV AREA TH	**Trailhead**	**None**	**None**		**$160,731**	**3**
BEAVER BOG TH	**Trailhead**	**None**			**$1,500**	**3**
TOTAL BOULDER R.D.					**$548,531**	

Table B 2. Canyon Lakes Ranger District Facilities List

SITE NAME (CLRD)	SITE TYPE	Water System	Toilets	Damage Rating	Preliminary Estimated Cost	Priority High = 1-2 Med = 3-4 Low >4
BRIDGES PUT IN	Boating Access	None	None	Low	$1,500	1
BRIDGES TAKE OUT	Boating Access	None	None	Low	$1,000	1
PINEVIEW PUT IN/TAKE OUT	Boating Access	None	None	Low	$5,000	1
STOVE PRAIRIE LANDING	Campground	Not Inspected	Functional	Low	$4,000	1
TOM BENNETT	Campground	None	Functional	Low	$5,000	7
BIG THOMPSON RIVER FISHING PIER	Fishing Site	None	None	Very High	$250,000	4
IDYLWILD ON BIG THOMPSON	Parking Area			Very High	350,000	5
FISH CREEK PG	Picnic Site	None		Intermediate	$6,000	2
DIAMOND ROCK	Picnic Site	None	Functional	Low	$5,000	2
POUDRE PARK	Picnic Site	None	Functional	Low	$1,000	2
STEVENS GULCH	Picnic Site	None	Functional	Low	$8,000	2
UPPER LANDING	Picnic Site	None	Functional	Low	$5,000	2
GLEN HAVEN	Picnic Site	None	Non-Functional	Very High	1,000,000	8
LOWER BIG THOMPSON	Picnic Site	None	Non-functional	Very high	$200,000	9
UPPER BIG THOMPSON	Picnic Site	None	Non-functional	Very high	$200,000	9
ASPEN 1 REC RESIDENCE	Rec Residence drive way	Not Inspected	Not Inspected	Low	$5,000	1
BENNETT CREEK SUMMER HOME GROUP (1-5)	Rec Residence-drive way	Not Inspected	Not Inspected	Low	10,000	1
ELKHORN CREEK	Trailhead	None	Non-Functional	Very High	$150,000	1

SITE NAME (CLRD)	SITE TYPE	Water System	Toilets	Damage Rating	Preliminary Estimated Cost	Priority High = 1-2 Med = 3-4 Low >4
MOLLY LAKE	Trailhead	None	Non Functional	Very High	$150,000	1
KELLY FLATS	Trailhead			Intermediate	$1,500	3
CROSIER MOUNTAIN - BORROW PIT	Trailhead	None	None	Intermediate	$75,000	3
DUNRAVEN	Trailhead	Not Inspected	Not Inspected	Low	$15,000	3
CROSIER RAINBOW - DRAKE	Trailhead	None	None	Very High	$25,000	3
PIERSON PARK	Trailhead	None	None	Very High	$1,000	3
TOTAL CANYON LAKES R.D.					**$2,474,000**	

APPENDIX C. MAP - AFFECTED FACILITIES AND ROADS



APPENDIX D. MAP - ERFO ELIGIBLE ROADS